Name __Key_____ AP Chemistry

Intermolecular Forces and Phase Diagrams

1) (a) Xe has dispersion forces while methanol has dispersion forces, dipole-dipole interactions and hydrogen bond. Therefore, the common intermolecular force is London dispersion force.
   (b) Methanol has London dispersion forces, dipole-dipole interactions and hydrogen bonds while acetonitrile has London dispersion forces, dipole-dipole interactions and hydrogen bonds. Therefore, these two molecules have all three intermolecular forces in common.
   (c) NH_3 has London dispersion forces, dipole-dipole interactions and hydrogen bonds while HF has London dispersion forces, dipole-dipole interactions and hydrogen bonds. Therefore, like b, these two molecules have all three intermolecular forces in common.
2) (a) Methanol has hydrogen bonds while CH_3SH only has dipole-dipole interactions as their strongest intermolecular force. Because hydrogen bonds are stronger than dipole-dipole interactions, methanol requires more energy to break these interactions to change from a liquid to a gas; therefore, it has a higher boiling point.
   (b) Both Xe and Ar only have London dispersion forces as their intermolecular forces. However, Xe has more electrons so it has a stronger London dispersion force so there is going to be more attraction between Xe atoms, making it a liquid, versus Ar, which is a gas with less electrons and less attraction between Ar atoms.
3) (a) H_2S
   (b) CO_2
   (c) SiH_4
4) (a) London dispersion forces for both; C_8H_{18} (has more electrons so stronger London dispersion forces and higher boiling point)
   (b) HOOH has hydrogen bonds while HSSH only has London dispersion forces. HOOH has stronger intermolecular forces so it will have a higher boiling temperature.
5) (a) deposition
   (b) condensation, then freezing
6) (a) sublimation (~ -70°C)
   (b) melting (~ -40°C)